CLAIMS

What is claimed is:

1. A sustained-release drug delivery device comprising a structural element and a drug reservoir, wherein the drug reservoir comprises a coating applied to the surface of the structural element, wherein the coating comprises an inorganic mesoporous oxide.

2. The sustained-release drug delivery device of claim 1 wherein the mesoporous oxide possesses substantially continuously interconnected channels.

3. The sustained-release drug delivery device of claim 2 wherein the majority of the interconnected channels have a diameter of between 1-100 nm.

4. The sustained-release drug delivery device of claim 3 wherein the majority of the interconnected channels have a diameter of between 2 nm and 30 nm.

5. The sustained-release drug delivery device of claim 2 wherein the mesoporous oxide is a triblock copolymer-template-based mesoporous oxide.

6. The sustained-release drug delivery device of claim 5 wherein the mesoporous oxide is selected from the group consisting of: an oxide of silicon and an oxide of titanium.

7. The sustained-release drug delivery device of claim 2 wherein the interior surfaces of the interconnected channels are coated with an agent that modifies hydrophobicity or charge.

8. The sustained-release drug delivery device of claim 7 wherein agent that modifies hydrophobicity or charge comprises a silane coupling agent.

9. The sustained-release drug delivery device of claim 2 wherein the drug reservoir coating is applied to the surface of the structural element by a method selected from the group consisting of: dip-coating, spray coating, spin-coating and painting.

10. The sustained-release drug delivery device of claim 2 further comprising a drug loaded within the drug reservoir.

11. The sustained-release drug delivery device of claim 10 adapted for delivery of the drug for a period of at least 3 days.

12. The sustained-release drug delivery device of claim 11 adapted for delivery of the drug for a period of at least 7 days.

13. The sustained-release drug delivery device of claim 12 adapted for delivery of the drug for a period of at least 30 days.

14. The sustained-release drug delivery device of claim 10 wherein the amount of drug loaded within the drug reservoir is between 1 to 1000 micrograms.

15. The sustained-release drug delivery device of claim 10 wherein the drug is an anti-restenotic drug.

16. The sustained-release drug delivery device of claim 15 wherein the drug is a taxol-derived drug.

17. The sustained-release drug delivery device of claim 16 wherein the drug is selected from the group consisting of PACLITAXEL, SIROLIMUS, and TACROLIMUS.

18. The sustained-release drug delivery device of claim 15 wherein the drug delivery device is adapted for implantation into the vascular system of a subject.

19. The sustained-release drug delivery device of claim 18 wherein the drug delivery device comprises a stent.

20. The sustained-release drug delivery device of claim 19 wherein the total amount of drug loaded within the drug reservoir is between 50 and 300 micrograms per stent.

21. The sustained-release drug delivery device of claim 2 wherein the drug is selected from the group consisting of: an anti-inflammatory agent, an antimicrobial agent, and antineoplastic agent, and angiogenic agent, an anti-angiogenic agent, a thrombolytic agent, an antihypertensive agent, an anti-arrhythmic agent, a calcium channel blocker, a cholesterol-lowering agent, a psychoactive agent, an anti-depressive agent, an anti-seizure agent, a contraceptives, an analgesics, a bone growth factor, a bone remodeling factor, a neurotransmitter, and an opiate antagonist.

22. A method for making a sustained-release drug delivery device, the method comprising the steps of: (1) providing a substrate surface, (2) cleaning the substrate surface, (3) providing a mesoporous oxide solution comprising an inorganic precursor and an amphiphilic tri-block co-polymer templating agent, (4) depositing a film of the mesoporous oxide solution onto the substrate surface, (5) drying the deposited film such that it becomes solid, wherein the mesoporous oxide, once dried, possesses substantially continuously interconnected channels.

23. The method of claim 22 further comprising loading a drug into the mesoporous oxide film, said loading occurring after the drying of the film onto the substrate surface.

24. The method of claim 23 wherein the drug is an anti-restenotic drug.

25. The method of claim 22 wherein the inorganic precursor is selected from the group consisting of SiO_2 or TiO_2.

26. The method of claim 22 wherein the mesoporous film is deposited on the substrate surface by a method selected from the group consisting of spin-coating, dip-coating or spray-coating or painting.

27. A method for delivering a drug to a subject, the method comprising implanting into a subject the sustained-release drug delivery device of claim 22.

28. The method of claim 27 for delivering a drug to a subject wherein the sustained-release drug delivery device is implanted within the vasculature of the subject.

29. The method of claim 27 for delivering a drug to a subject wherein the sustained-release drug delivery device is implanted sub-cutaneously within subject.

30. The method of claim 27 for delivering a drug to a subject wherein the drug is an anti-restenotic drug.

31. The method of claim 27 for delivering a drug to a subject further comprising releasing the drug in a controlled manner.

32. The method of claim 31 for delivering a drug to a subject wherein the drug is continuously released for a period of at least 3 days.

33. The method of claim 31 for delivering a drug to a subject wherein the drug is continuously released for a period of at least 7 days.

34. The method of claim 31 for delivering a drug to a subject wherein the drug is continuously released for a period of at least 30 days.